

LANDSCAPE-LEVEL ASSESSMENT OF PRESCRIBED FIRE EFFECTS ON OAK REGENERATION

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Background

- Human modification of historical fire regime linked to decreased oak regeneration.
- Red maple and other fire-sensitive species poised to replace oaks.



- Clear costs, as acorns provide food for many animals, and oak timber is highly valuable.

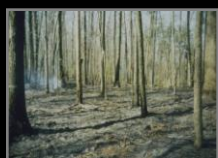


- Prescribed fire increasingly used as a management tool to regenerate oaks.



Objective

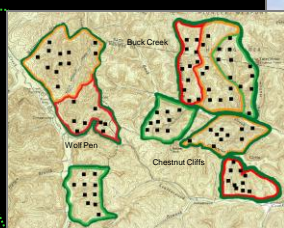
- Test ability of prescribed fires to increase oak seedling growth and survival relative to other woody seedling deemed potential competitors.



Study Design



- Three study sites
- Three treatments per site
- 8-12 plots per treatment
- Unburned
- 1x Burn (Spring 03)
- 3x Burn (Spring 03, 04, 06)



Seedlings

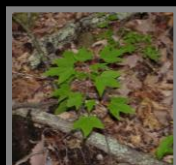
- Annual summer sampling since 2002 (pre-burn) of ~ 3,000 permanently tagged seedlings of oak and competitor seedlings.



Red oaks = black, northern red, and scarlet



White oaks = chestnut and white

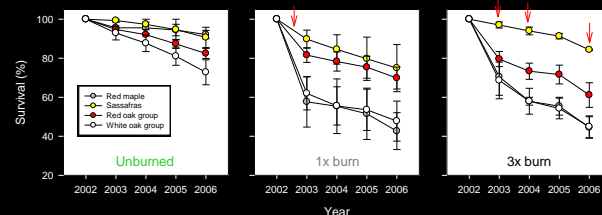


Red maple



Sassafras

Survival



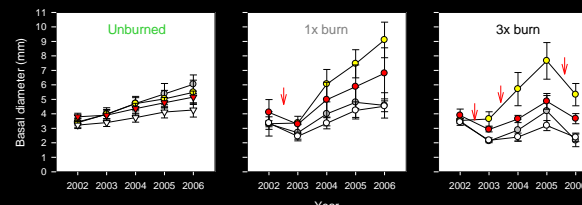
- On unburned plots, survival was lowest for red and white oaks and greatest for sassafras and red maple.

- Burning 1x decreased survival of red maple and white oaks. Sassafras and red oak survival were greatest.

- Survival of seedlings burned repeatedly was similar to 1x burn. NOTABLY, sassafras survival remained high.

Error bars are \pm SE. ∇ = burn

Basal Diameter

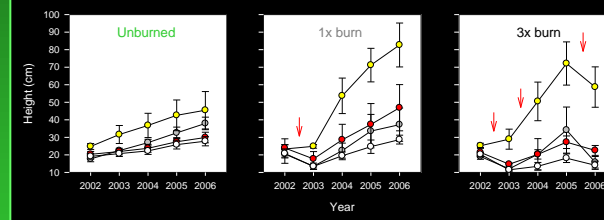


- On unburned plots, basal diameter of all species slightly increased over time.

- Burning 1x increased diameter of red oaks and sassafras. White oaks and red maple appeared unaffected.

- Seedlings burned 3x responded similarly to those burned 1x, except after last burn, when diameter of all decreased.

Total Height

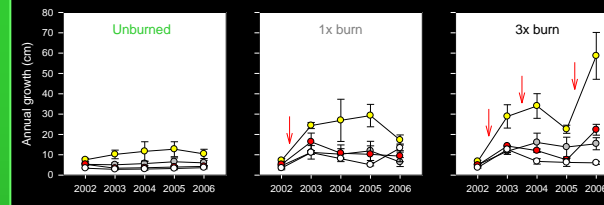


- Without burning, sassafras and red maple grew taller than oaks.

- After one burn, red oak height increased, but sassafras were twice as tall.

- Sassafras still grew taller after repeated burns, while height of other species declined.

Annual Height Growth



- Without burning, annual growth was greatest for sassafras.

- After one burn, sassafras had the greatest increase in height growth.

- Again, repeated fires promoted sassafras growth more than other species.

Conclusions

- Among oaks, single and repeated prescribed fires had more positive effects on red oaks than white oaks.
- Red maple mortality was high following burns, and basal diameter and height growth of surviving seedlings were similar to or lower than those unburned.
- Sassafras survival and growth were substantially enhanced by fire.
- On sites where sassafras is dominant, burning may be detrimental to oak regeneration, at least in the short term.
- The efficacy of prescribed burning to increase the abundance of ecologically and economically important oaks remains questionable and requires further long term monitoring.

Special Thanks to...

